BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

Wireless Broadband Access Task Force Seeks Public Comment on Issues Related to Commission's Wireless Broadband Policies	)))	GN Docket No. 04-163

To: The Wireless Broadband Access Task Force

COMMENTS

The FCC, in its initiative "The Wireless Broadband Access Task Force" (DA 04-1266), asks participants to comment on the regulation and environment of broadband wireless, with a focus on growth and development of wireless Internet service providers (wISPs). NexGen City (NGC) would like to respond with comments to this important initiative.[1]

NGC was established in 2002 by founders who recognized that first responders needed a better way to transmit data than the traditional wireless systems that are so prevalent around the nation. NGC is focused on delivering integrated, high-speed public safety data communications systems to cities and counties throughout the United States.[2]

Discussion

This proceeding is a matter very important to NGC, the spectrum policy makers and leaders issuing this inquiry, and indeed our country. NGC has spent considerable time and effort to bring broadband wireless to fruition and to offer the advanced wireless broadband services

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[1] NGC recognizes that this initiative is a follow-on to the groundbreaking Spectrum Policy Taskforce hearing held two years ago, and the Advanced Services Inquiry (Section 706) highlighted as "FCC Issues Inquiry for Its Fourth Report on Advanced Telecommunications Capability" issued this year. *See, e.g.,* http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-55A1.pdf.

[2] http://www.nexgencity.com/news.html; http://www.nexgencity.com/.

addressed in this inquiry. We have a short but energetic history in advancing high speed mobile broadband wireless, primarily for the public safety segment, and believe that our mission significantly parallels the goals of the FCC[3] and those of the Department of Homeland Security[4] in this regard.

NGC advocates the opening up of 100 MHz of spectrum in the appropriate part of the 470 MHz to 806 MHz segment of the radio spectrum ("the UHF band"), in the sprit of the recently issued FCC initiative titled "Unlicensed Operation in the TV Broadcast Bands" (ET Docket No. 04-186).[5] NGC seeks channelization suitable for broadband wireless operation (unlike the current channelization for "voice band" operation in the upper and lower 700 MHz band plans where channel bandwidths of up to 150 kHz do not offer true broadband capability). NGC feels it is imperative that the FCC provide this additional broadband wireless spectrum for the operation of high speed mobile broadband services by first responders, states and local governments. In this manner, the FCC will enhance the emerging "mobile Internet" for mission critical content and interoperable communications.

NGC's specific responses to the FCC's inquiries are as follow:

1. Does wireless broadband offer good DSL & cable alternatives?

Broadband wireless provides excellent alternatives to DSL and Cable. Broadband wireless allows broadband services to extend beyond fixed locations to moving objects, whether persons,

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[3] http://www.fcc.gov/broadband/.

[4] http://www.dhs.gov/dhspublic/theme_home1.jsp; http://www.dhs.gov/interweb/assetlibrary/DHS_StratPlan_FINAL_spread.pdf.

[5] http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-247169A1.pdf.

vehicles, machines, or airborne (and potentially space-borne) platforms. The ability to extend the "fixed Internet" to a "mobile Internet" (a place where moving persons and objects create content and exchange communications) will allow the diverse plethora of applications on the fixed Internet to be available on moving objects. Public spectrum should be used primarily for the ability to connect moving and portable endpoints, and temporarily fixed endpoints (and not wasted on permanently fixed endpoints that have the opportunity to become wired over time.)

2. Is there enough broadband spectrum?

There is an insufficient amount of spectrum, and in the wrong part of the spectrum band, for the coming broadband access requirements of wireless ISPs and municipal network operators. The access link, or "the last mile," has traditionally been the weak link in the communications infrastructure. The FCC has the ability to lead the liberation of locked up, inefficiently used spectrum, for last-mile, mobile, broadband access, for urban and rural use. There is insufficient spectrum today, and more is needed. The FCC has the leadership to create and lead the vision of the mobile Internet (from land mobile and cellular radio), a revolutionary change much like the revolution that occurred in the fixed network with the fixed Internet evolving from the telecommunications infrastructure. While most wISPs currently only offer fixed point to multipoint data service, the trend is toward voice, and later (a significant competitive advantage to DSL and Cable service), mobility and portability. Thus, a visionary and forward looking regulatory structure would look to provide, not just "voice-band" spectrum in an incremental approach to Internet access, but broadband spectrum to liberate the last mile for the mobile Internet. Commercially available, standardized devices for wireless LANs operate with 20 MHz channels (802.11b, g, a, etc.). NGC's technology (currently proprietary) uses this common standard channelization. In order to foster the use of these inexpensive and advanced

technologies for consumers and public safety, spectrum should be allocated in at least this level of channelization. To provide the best propagation conditions for inexpensive "cost of coverage", UHF frequencies (470MHz to 806 MHz) versus SHF frequencies (e.g., 4.9 GHz) should be allocated, which at that frequency, allow for the longer range needed for cost effective coverage and rural service. To provide for the first phase of cognitive radios, and multiple competitive operators in a market, more than one channel should be available. Phase one cognitive radios contain one control channel and several traffic channels to allow traffic to find the lowest interference temperature in the band and thereby minimize interference. NGC calls for at least 100 MHz of spectrum in the UHF band to support the broadband mobile Internet, allow for phase one cognitive radios, and enhance competition in the marketplace.

3. Do licensed and unlicensed complement each other?

Licensed and unlicensed spectrum do not complement each other, but will converge. NGC believes there will be a strong move from licensed to unlicensed management of the spectrum resource, given the technology evolving, the increased competition, and the rapid invention and adoption of new services and applications. And with the increased use of underlay, cognitive radio, software defined radio, and interference temperature approaches to increasing spectrum utility, we believe licensed spectrum will assume more of the characteristics of a "communal" band such as the unlicensed band. And the unlicensed band must evolve toward a spectrum etiquette that limits interference to avoid becoming an unusable band by virtue of its popularity. Thus, it is not a matter of complementing, but rather a matter of each evolving into the other, to some extent, in a manner that preserves quality for consumers and end users. The phase-one spectrum etiquette recommended is one whereby the best of three channels is selected for traffic based on minimization of interference.

4. Is licensed/pay, unlicensed/non-interfere, and first-come-first-served techniques good methods to distribute spectrum?

The unlicensed approach, with interference mitigation, is the best way to distribute spectrum. While there are successes and failures in both licensed and unlicensed management of spectrum, in general the model for unlicensed use of spectrum is a success story, and that of auctioned license spectrum, is a story with many examples of delays and false starts. We believe that with the proper techniques for limiting interference, unlicensed spectrum will be the proper model for the quickest delivery of useful applications and services to end users. On balance, auctioned spectrum has attracted large companies, with deep pockets, and the scope and scale to deploy widely, yet the result has been delayed deployment and advancement of useful benefits to consumers. A model evolving to first come first served and unlicensed with interference minimization through cognitive radio techniques is the most effective for future allocation of spectrum.

5. Do rules support portability and mobility?

The rules do not provide sufficient interference protection and flexibility for portability and mobility. The distinct competitive advantage offered by wireless is portability, move-ability, mobility, or nomadicity. The flexibility offered by the current focus on providing higher power operation in rural areas on a non-interference basis allows for the use of geopositioning aware technologies to increase power when appropriate for maintaining service in outlying areas. Phase one cognitive radios can now avoid interference through the use of a control channel and additional traffic channels. Also, the rules could recognize the use of advanced technologies for public safety that have access to aeronautical mobiles (unlike the 4.9 GHz band that has restrictions against aeronautical operations). Lastly, the Commission should look to open UHF

frequencies, the band with the propagation that is most useful for mobile use, rural use, and for portable and movable operations.

6. What regulatory incentives would foster continued investments?

The opening up of spectrum at UHF offers the most promise of continued investments. Investments are picking up in the area of broadband Internet access due to the significant benefits available by the profusion of information and content on the web, both the fixed and mobile Internet. Societal trends are toward dynamic operations, from mobile video to interactive collaboration. These applications require broadband and favorable propagation. And for public safety and first responders the capabilities of a UHF mobile Internet is significant. So the best regulatory milieu is one that recognizes that light regulation and minimization of barriers to entry and uncertainty will foster continued investments.

7. What is the extent and nature of deployments?

Today most broadband deployments are fixed point to multipoint, which should be at best a temporary use of spectrum. At worse, it is a waste of spectrum. Today's broadband wISPs are deploying fixed point to multipoint services to satisfy the huge pent up demand for affordable Internet access. Fixed access technologies like cable modems and DSL are coming down in price, yet the reach is still insufficient for remote and rural use. But long term, in urban environments, the highest and best use of wireless is the mobile Internet. Our deployment in Garland, Texas of a mobile Internet, owned by the City, and used for emergency services and municipal services is a model of the next generation city. While today this type of deployment is forward looking, it promises to be the end game for wireless systems, i.e. liberating the mobile Internet.

8. Are there any rules that require review and updating for more flexibility, for advanced technologies such as mesh etc.?

Yes, rules updates for more flexibility can come in the areas of phase one cognitive radios, using industry standard broadband channelization. Spectrum allocations for public safety and first responder broadband access are positioned in less than desirable spectrum (at 4.9 GHz for example) with technical issues ranging from difficult spectrum purity requirements to just plain propagation issues relating to spectrum allocation for the application.

Currently popular and affordable broadband wireless technologies come in larger channel bandwidths, typically 20 MHz channelization. Rules and a spectrum band that allows for multiple channels, that include smart radio control channels, would allow for phase one cognitive radios, competition, and the use of interference reducing spectrum etiquette to foster broadband wireless.

9. What applications, content versus transport, rates, asymmetry, and fixed mobile portable take rates?

The applications possible, particularly to the emergency services are phenomenal. Imagine real-time video (not just streaming video) of disaster events being sent to a command and control center. Imagine a patrol officer being able to download a high resolution picture of a perpetrator and confirming the identity at a normal traffic stop. Imagine a miniature video camera clipped to the officers applet connected to the officer's handheld communicator displaying real-time events. Imagine an EMT using real-time video to the hospital of a trauma case in high speed travel toward the hospital. Imagine a fireman with a smart shirt connected to his handheld communicator where the local commander can read his biometrics including respiration rate and telemetry including the knowledge of how much air is left in his air tank.

Imagine the ability to dynamically create and dissolve talk groups from a hand held communicator. Imagine conferencing and multicasting voice across 300 square mile coverage areas. Imagine being able to detect and tract nuclear or hazmat material as it enters any port of entry in the country. These applications are facilitated by true broadband spectrum, with multiple 20 MHz channels, mesh techniques, and the proper spectrum management and regulation.

10. What pilot programs are good models?

A good model is the commercial deployment of an advanced mesh network technology that the City of Garland, TX deployed and accepted — a NexLink™ wireless broadband mobile network — in May 2004. The users of the system are the 290 officers in Garland's Police Department. Other departments will be added later. Conversion from the Department's Cellular Digital Packet Data (CDPD) network was made within one week, during which mobile data terminals in the City's 80 squad cars were outfitted with NexGen City's NexCard™ wireless interface and software. This implementation fulfilled the City's communications vision for a fully-converged, high-speed data, voice, and video network over which police, fire, and emergency medical personnel and, eventually, all City departments will be inter-connected in real time.

Initial implementation focused on data with applications that Garland police officers use everyday, such as their Computer Automated Dispatch system. Everything is the same as before, including the user interface, but with one big exception — the 20-fold transmission speed increase with which they can now push 9-1-1 calls, alarms, report management, graphics, and mug shots to patrol cars throughout the City's 57-square-mile area. Later they plan on phasing in additional productivity-enhancing public safety applications such as live video streaming and Voice over IP (VOIP), which they could never send over the 19.2 Kbps CDPD network.

Prior to the NexGen City NexLink system deployment, Garland police mapped the City's CDPD network to measure existing coverage gaps and downtime. The team found large areas with no coverage. Since implementation, they have eliminated many coverage gaps, and downloads are significantly faster than before. This translated into more time on the streets for police to ensure the safety of the 221,000 residents of Garland, since they can now complete more reports and other paperwork in the car and not have to return to the station for this activity.

The NexGen City NexLink Network's mesh-based communications system combines data, VOIP calls, and streaming video at broadband connection throughput speeds of 1.5 Mbps (with bursts up to 6 Mbps) all while traveling at highway speeds in excess of 100 mph[6]. The mobile components and fixed intelligent wireless routers and access gateways are network nodes acting as repeaters and routers. This creates a self-forming and self-healing network with ad hoc peer-to-peer networking capabilities. With an embedded wireless router in every device, each unit can extend the network, determine optimum paths for data transmission, and provide additional paths for connectivity.

11. What better support can be provided to states and municipalities?

Liberating the innovative services and applications in a UHF broadband band targeted for states and municipalities, and innovative operational models would best support state and municipalities. Better support to theses entities include offering incentives to them to acquire and use spectrum, and providing priority to these entities as shared spectrum evolves. Sufficient spectrum set-asides or priority for them provides adequate capacity for the applications

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[6] http://www.nexgencity.com/articles/PR_NexGen%20City-Garland%20Acceptance_040521_JSC.pdf.

mentioned previously. A better operational model that allows cities to use or sell excess capacity to their end users or customers would allow for additional economic incentives to cities to deploy these systems widely.

This can be fostered by providing states and municipalities with UHF spectrum and allow them to coordinate those allocations themselves. Allow each state to have a spectrum allocation that overlaps with the adjacent state to foster interoperability. Use a combination of modulation schemes to support spectrum reuse.

12. What are wISP barriers to entry?

The barriers to entry for wireless ISPs and municipal network operators are the uncertainty of the economics of limited, voice band, spectrum allocations. Currently the 80 MHz at 2.4 GHz, and the 300 MHz at 5.8 GHz allows for adequate broadband operations, but these bands are becoming congested. The 50 MHz at 4.9 GHz for public safety, at that SHF band, does not allow for multiple channel broadband phase one cognitive radio operation, is expensive, has limited propagation, and does not allow for aeronautical operations. A UHF alternative band is required to lower barriers to entry for municipalities and wISPs. Also, financing and grants to municipalities through the Department of Homeland Security and other departments of government would foster the creation of community networks and the mobile Internet.

Conclusion

NexGen City appreciates the opportunity to voice our vision of the future for wireless ISPs and municipal network operators, and strongly advocates the allocation of 100 MHz of spectrum to the mobile Internet, with priority for public safety, but with the ability to provide flexible use, competition, and phase one cognitive radio capability for the benefits of consumers and public safety personnel.

Respectfully submitted,

/s/

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